

interstellar medium. The pertinent observations are summarized and the physics needed to interpret the data on absorption, scattering and polarization of starlight and on the dynamical phenomena in expanding H II regions (those containing ionized hydrogen) and supernova shells is simply and lucidly developed. The figures rarely occupy more than an half page and tables are also brief and to the point. Each chapter is followed by a rather extensive bibliography; a very helpful appendix defines the symbols used in the book, with references to the equations in which some of the terms are introduced and with numerical values of the constants. The index lists subjects, but not astronomers.

Spitzer and his colleagues at Princeton have participated in much of the theoretical work covered in this book and have stimulated several of the rocket and spacecraft experiments aimed at studying interstellar grains through their effects on the transmission of ultraviolet radiation. The related subject of the formation and evolution of spiral arms in the gas (in which they have been less deeply involved) is not discussed and is in fact more suited to a discussion of galactic structure. The book is well written, well produced in a convenient format and highly recommended.

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Fundamentals of Radiation Protection

By Hugh F. Henry

485 pp. Interscience, New York, 1969.
\$17.50

The subject of radiation, its hazards and its benefits, is one of the most important of our day. Its full utilization has been hampered by scare tactics supported by implications based on areas that have not been adequately investigated. On the other hand, potential hazards have been ignored because of the zeal for its employment by certain groups who wish to avoid restrictions and who justify this by stressing risk versus gain concepts.

The author of this volume has attempted to treat all aspects of the radiation protection problem, if not in detail, at least with a cursory examination. In his attempt to combat some of the publicity that has been accorded to the protagonists of lower permissible levels and greater restrictions for reactor siting, it would appear that in some cases he is guilty of leaning too far in the other direction. His neglect of detail can be excused by his attempt to reach

a general and rather unsophisticated audience. One can question the value of the book on this basis, but Hugh Henry clearly states in the preface that this is his objective, and it appears that he has done a rather fine job in meeting it.

The book covers all the basic disciplines involved (physics, biology, radiation effects, and dosimetry), the special topics of maximum permissible exposure levels, monitoring and protection. In addition, emergency situations, administration of health-physics programs and nuclear weapons are discussed in separate chapters. He concludes with a discussion of the benefits that can be derived from sources of radiation.

The usefulness of the book is probably impaired by the author's failure to go into details, by its rather offhand dismissal of many problems and by the lack of specifics. In addition, the validity of some of the dose values cited can be questioned. The accuracy of some illustrations and definitions have been compromised by the desire to oversimplify the subject, which must be dealt with precisely in order to have meaning. These factors, combined with the author's obvious desire to minimize the problems precipitated by possible radiation hazards, probably compromise the book's value. However, if one is willing to supplement and clarify issues with fuller discussions, the book could be useful for elementary courses. It does cover the entire field of health physics quite comprehensively and does have an excellent bibliography restricted explicitly to the material mentioned in each section.

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Springer Tract in Modern Physics: Synchrotron Radiation as a Light Source: Electron-Phonon Interaction and Boltzmann Equation in Narrow-Band Semiconductors

B. Höhler, ed.

120 pp. Springer-Verlag, New York,
1969. \$10.50

It is characteristic of the awakening interest in synchrotron radiation that, almost simultaneously, two reviews of the subject have recently appeared. The one reported here is presented on 73 pages (including bibliography). The other, somewhat longer review is the book by A. A. Sokolov and I. M. Ter-nov [see review, page 47].

Godvin's review is remarkably well written. It is somewhat limited, as he

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deliberately draws on the experience in "solid-state studies performed at the Deutsches Elektronen-Synchrotron (DESY)" and in doing so apologizes "for the insufficient credit given other workers, particularly those at the Tokyo, Frascati and the National Bureau of Standards synchrotrons."

As the title of the review indicates, it is "user" oriented, considering the synchrotron "as a giant light bulb." For this reason the properties of the radiation emitted by the orbiting electron are condensed into about 11 pages. The author approaches the formalism of the characteristic properties of synchrotron radiation by using intuitive physical arguments. The reader who wishes a more formal approach can use the abundant reference list. This is followed by practical consideration and advice about the use of the radiation. The review mainly is devoted to solid-state experiments carried out in Germany.

The documentation is quite good and up to date. All in all about 170 references are given, with a good number published in 1968, and even a few in 1969. Sokolov and Ternov's book is mentioned, with adequate reference to the voluminous Russian literature on this subject.

The second review in this slim volume is a 45-page examination of the electron-phonon interaction and the Boltzmann equation in narrow-band semiconductors. It is a purely theoretical investigation of the interaction of electrons, or holes, with acoustic and polar phonons in electronic bands with a width ΔE , which is of the order of $k\theta$ or even smaller than $k\theta$. The Boltzmann equation is derived and applied to a one dimensional model. A few remarks are added on the three-dimensional case.

LADISLAUS MARTON
Editor, *Advances in Electronics
and Electron Physics*

Advanced Physical Chemistry: A Survey of Modern Theoretical Principles

By S. M. Binder

554 pp. Macmillan, London, 1969.
\$13.95

This book is written at the graduate level and covers the following topics: a mathematical introduction (about 400 pages); classical and quantum mechanics (60 pages); theory of gases (100 pages); thermodynamics (100 pages) and statistical mechanics (130 pages). The material is set out well and the topics are sensibly chosen.

It was interesting to examine where this book introduced material not normally treated in physics courses. I think I could identify 5% as such, meaning

that 95% overlaps with physics. Then one has to say that the title "Physical Chemistry" must be justified by the difference in the treatment. It is true that the approach is different, and it is a little more colloquial than most texts. Now and again some clear immaturities are found; for example, a whole page is devoted to how a hypodermic syringe can be used to fill ink capsules. Also some strangely opaque statements occur: For example, in discussing standard states (dear to physical chemists) the author states that "For real gases, a hypothetical standard state is defined: the state of unit fugacity. Fugacity is the thermodynamic analogue of pressure in nonideal gases."

As a physicist engaged in biology, I looked in vain for the regions where normal physics treatments do *not* cover areas of chemistry, notably the liquid state. For students, an exposition of Frenkel's work would be most valuable and some idea of the whole concept of water and how its conformations interact with ions and nonpolar substances would be extremely useful.

I could not help thinking that the kind of course for which this book would be used represents a bypass of what should be given by physicists in a physics department. Maybe the whole collection is not to be found in such departments, and, if so, I suggest physicists get the message and introduce the course needed.

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Type II Superconductivity

By D. Saint-James, G. Sarma,
E. J. Thomas

294 pp. Pergamon, New York, 1969.
\$14.00

Interest in type-II superconductivity has recently been encouraged by the discovery that many type-II superconducting compounds have high critical fields that allow their use in superconducting magnets. In addition, many of these compounds have exceptionally high transition temperatures. D. Saint-James, G. Sarma and E. J. Thomas have made considerable contributions to the theoretical and experimental understanding of type-II superconductors. In *Type II Superconductivity*, the authors present the results of their research and give an interesting survey of the available information.

The first half of the book, written by Saint-James and Sarma, covers reversible properties. The opening chapter is a general introduction to superconductivity, similar to the development in the initial chapters of P. G. deGennes's book, *The Superconductivity of Metals*